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Davidov, Eldad

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# Explaining habits in a new context: the case of travel-mode choice

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## **Explaining Habits in a new context: The Case of Travel-Mode Choice**

### **Abstract**

It is often assumed that habits constitute an important component in human behavior. However, since the beginning of the century many sociologists have overlooked their role in explaining behavior. In this paper we are testing empirically the completeness of an economic model made by Stigler and Becker to explain the effect of habit on behavior in a new context. According to the model habits are economically efficient in many cases. However, when an individual is faced with a permanent change in the environment, behavior is not determined by habits, but by the amount invested in information on the best options. We collected data from a field experiment on travel-mode choice with an intervention program to change behavior of people moving to a new town. The intervention included information on available public transportation. Habit was measured by the subject's judgments of the likelihood that using public transport will take place in different kinds of situations. Theory was confirmed by the empirical data: there was no effect of habits on behavior in the new context. People in the intervention group used public transportation more often. However, search for information prior to the move had no effect. Some socio-economic variables had an additional effect on behavior in contrast to theory. People with a car at their disposal and those with higher education used the car more often.

**Keywords:** habits; narrow and wide versions of rational choice; travel-mode choice; intervention study.

## **Explaining Habits in a new context: The Case of Travel-Mode Choice**

### **1. Introduction**

It is often assumed that habits constitute a basic and important component in human behavior. However, since the beginning of the century many sociologists have overlooked the role played by habits. In his historical study Camic (1986) provides different reasons why habits have been overlooked in the sociological literature although they were very important in the studies of Weber (1908-9) and Durkheim (1893). The main reason was the attempt to establish sociology as an independent discipline at the beginning of the century. This attempt towards autonomy resulted in the severing of ties with psychology where habits played an important role.

A useful way to view habits is as an act of custom and tradition (Stigler and Becker, 1977). Travel mode choice is often discussed in literature as a habitual behavior (e.g. Boe, Fujii and Gärling 1999; Verplanken et al. 1994, 1998). Using the elevator or watching the news daily may be influenced by habitual behavior. In 1992 Becker defines habits as displaying a positive relation between past and current consumption. Indeed, some effects of past on present behavior are apparent. Habits are acts performed on an experienced basis, which economize on resources and in which one does not invest much thought while performing them. Using the elevator for the first time needs much more

effort than after the act becomes a routine. In theories on habit formation and persistence habits have mainly three common properties: (1) they are stronger the longer they exist; (2) they are stronger the more frequently they are repeated; (3) they simplify actions as they economize on resources and decrease complexity.

I would like to mention that followers of human behavior have distinguished between addiction and habits<sup>1</sup>. Addictions are defined as particularly strong habits (Berger, 2001; Becker, 1992) and as such they have a different behavioral function. Becker and Murphy (1988) provide examples for addictions such as alcoholism, heroism or work (see also Becker, Grossman and Murphy, 1991). In this paper the focus lies on the effect of habit on behavior in a new context. The completeness of the economic model made by George Stigler and Gary Becker (1977) to explain the role played by habit will be tested empirically, and additional explanations of behavior thus identified suggest a wider model of rational choice than the one proposed in economics. First I will describe how some thinkers in the social sciences viewed habits. Then I will present Stigler and Becker's model. In the empirical section the hypotheses will be introduced and the empirical analysis will be performed with data from an experimental field study on travel mode choice. We will end with a discussion of the results.

## 2. Previous Research

Habit was an established concept among ancient Greek thinkers, theologians and philosophers and among major figures of the 'Enlightenment', such as Rousseau, Hume and Kant (Camic, 1986: 1046-7). The action designated as a habit broadens to various

patterns of conduct in the social world. Durkheim defined it as a mechanical process or “a force” (1893: 159, 242). Bourdieu argues that habits are behavioral patterns, which means they were absorbed into the body becoming a part of the actor - an internalized counterpart to the body of the car (Bourdieu, 1984). Bourdieu views ‘habitus’ as the internalization of the structures of the social order. For Weber habits or customs were an unreflective disposition (“Eingestelltheit”) to engage in actions that have been long practiced (1908-9: 93-94) and constituted a relationship between economic units (1922: 67-68). There could be habits of economic, political, religious and domestic behavior, habits of obedience to rules, habits of sacrifice and so on. In all domains habits constitute a main determinant of human behavior.

Weber maintains that habit and tradition are also responsible for the creation of norms. Customs are transformed into binding norms. In the next phase these norms produce expectations of others to abide by them (1922: 326, 754). Such inner dispositions of habit sometimes contain inhibitions against change and innovations (1922: 988). Norms constitute a social pressure to perform a behavior and are not taken into account in mainstream economics. Similarly to Weber, Esser also views habits as a behavioral pattern relevant to several economic domains (for example, Esser, 1990, 1993, 1996, 1999).

In social psychological literature, two traditions of viewing habits have developed. In one of them habit is defined as a behavior that has become automatic and thus occurs without self-instruction (Aarts and Dijksterhuis, 2000; Aarts, Verplanken and van Knippenberg,

1998; Bagozzi, 1981; Fazio, 1990; Ouellette and Wood, 1998; Ronis, Yates and Kirscht, 1989; Triandis, 1977 and 1980; Verplanken and Aarts, 1999). Even complex behaviors (once repeated over time) can habituate and become more or less automatic. They are performed quickly, with minimal attention and at the same time with other activities (see Ajzen, 2002, and also Bargh, 1996; Posner and Snyder, 1975). In another tradition habit has been defined as the tendency to repeat past behavior in a stable context (Ouellette and Wood, 1998). A learning process is therefore *required* for a habit to take place.

Theory suggests that there are two main types of ways to stop habits. The first tries to break the automatic process. The individual has to decide to stop the behavior (Ronis, Yates and Kirscht, 1989 P.232). A precondition for the change is that the individual is aware of alternative ways of conduct. The other way is to change the context. A new situation or a new place of residence are two examples of a new context. In intervention studies one can combine the two approaches to stop habits.

Several studies in economics have tried to explain habits. What they all have in common is that they view habits as a rational choice, which economizes on resources. Stigler and Becker's (1977) explanation of habits is also economic in nature. Their approach belongs to a family of dynamic models of rational habit formation developed in later years in which the strength of a habit is affected by its frequency and duration. However, these models are myopic (e.g. Muellbauer, 1988; Orphanides and Zervos, 1998; Spinnewyn, 1981). Contrary to the view that habits reflect an automated or a stable behavior which occurs without self-instruction (see also Mill, 1972:484) in Stigler and Becker's approach

habit (or ‘custom’ as they name it) is explained as a result of a utility-maximization process. Consequently, under some circumstances it makes sense to develop habits because it maximizes the utility of an individual. In their paper Stigler and Becker explain the conditions under which habits develop and here the focus is on their approach.

In the main section they examine how marginal investment in consumption might generate a more efficient production function for pleasure. Whereas this main section discusses how a production function for pleasure is maximized it does not concentrate on habits. Since the modeling of habit is of main interest, only a fairly small part of their paper (part 3) is the center of attention. For a further treatment of Becker on habits see Becker 1992. In the following section this approach is elaborated.

### 3. The model setting

In economic theories habits are considered as constituting a generalized calculus of a utility-maximizing behavior. Rational forward-looking consumers consider how greater consumption in the present influences the future marginal utility. In this tradition whatever we do can and should be rationally explained. Stigler and Becker’s model provides the conditions under which it is rational for a reasonably forward-looking individual to develop a habit.

They start by arguing that making a decision is costly. It is not costly only because it is an activity that some people find unpleasant, but because it is a behavior which requires



information which has to be analyzed. Habits may be a more efficient way of dealing with changes in the environment. Rather than finding out what is the best behavioral option, doing what has always been done in many cases turns out to be efficient in economic terms. In doing so one does not have to invest in any information costs to find the best options.

How can information costs be quantified? Obtaining information is expensive and requires monetary and time resources (time resources can also be quantified, see for example Becker, 1965, and its empirical test in Davidov, Schmidt and Bamberg, 2003). When a consumer buys one unit of a commodity  $X$ , he faces several options: to search at the time of each purchase to obtain the lowest possible price or not to search at all. The price of using the bus for example is not only the price of purchasing the ticket but it also includes the cost of looking for information about the cheapest way of using it.

“Cheapest” is also most convenient and least time consuming and according to our interpretation it includes for example the search for existing bus routes, their time-table, the location of the bus stops etc. In Stigler and Becker’s words: “In this simple model with  $r$  purchases between successive searches,  $r$  is larger the larger the amount spent on search per dollar spent on the commodity” (Stigler and Becker, 1977: 83). Thus, the number of purchases depends positively on the cost invested in the search for information; the more information obtained, the more often the individual will purchase this commodity (for the mathematical details see P. 83).

However, what happens in a new context? Do habits continue to determine behavior? Stigler and Becker argue that the model implies that when an individual is faced with a moderate or a temporary change in the environment, it may not pay to disinvest resources in the capital of knowledge or skills in order to accumulate new information for a full utility-maximizing decision (Stigler and Becker, 1977: 82). In such a case it is expected that habits will determine behavior in the new context. However, when an individual is faced with a permanent change, Stigler and Becker do not expect habits to determine behavior.

#### 4. Implications for the use of transportation

Stigler and Becker write about habitual consumer behavior in this model. However, they do not limit their model to consumption. In literature we find several studies documenting travel mode choice as a habitual behavior. Triandis (1977) suggested that behavior is determined by the sum of habit and intention. Based on this study, Boe, Fujii and Gärling (1999) argued that travel mode choice is an automatic and habitual behavior. They supported this argument with experimental data. Verplanken et al. (1994, 1998) found that car choice is a habit. It is a daily action, which in many cases once established becomes an automatic action. We follow this literature and argue that travel mode choice is a behavior, which habits could explain. Needless to say, it can also be explained by other determinants. Therefore, we decided to use travel mode choice in order to test the implications of the model empirically.

#### The measurement of “Habit”

Triandis (1980) defines and discusses the measurement of the habit concept. About the measurement of habit he writes: "Habits can be measured by the frequency of occurrence of behavior, *by subject's judgments of the likelihood that a behavior will take place in different kinds of situations*, and by a subject's response of how frequently she or he has done something" (p.205, italics added). The use of past behavior as a proxy for habits has been sharply criticized in literature. For example, Ajzen (2002) argued that past behavior is not an acceptable way to measure habits. Past behavior has a large common variance with present behavior but its effect attenuates when intentions and plans of behavior are well-formed. A measure of the concept of habit should reflect a reasoned process independent of past behavior, which has been done in the past and still prevails in the present. One could criticize the first proposition of Triandis how to measure habits in a similar way. For that reason Verplanken developed for the first time a measure of habit, which is independent of past behavior, and it is the only attempt known to measure habits independently (for details see Aarts et al., 1998; Verplanken et al., 1994). The second option Triandis proposed is exactly what the response frequency habit measure of Verplanken is doing.

In order to obtain it individuals are confronted with a set of destinations and they have to indicate under time pressure the travel mode they would most likely use for that purpose (such as traveling by car, bus or train). The hypothetical situations include: (1) summer trip with friends; (2) visiting a boyfriend/girlfriend; (3) visiting relatives or friends; (4) doing sports activities; (5) strolling in town; (6) going to a bar in the evening; (7) having a trip when the weather is nice; (8) routine grocery shopping; (9) eating in the dining

commons; (10) going to the movies or to a concert. In this measure according to Verplanken et al. the frequency of travel-mode choice indicates habit strength.

There are empirical arguments in favor of this measure. First, convergent validity has been established by finding robust correlations with past behavioral frequency (e.g., Aarts, 1996). Secondly, and most importantly, in a number of studies the discriminant validity of the measure has been clearly demonstrated. Furthermore, Bamberg, Ajzen and Schmidt (2003) have shown by factor analysis, that intention and this measure of habit are two different constructs. For further discussions see the Verplanken and Aarts (1999) review paper, Verplanken et al. (1994), Verplanken et al. (1998) and Verplanken and Orbell (2003). This proposal was applied in our data. We computed the percentage of public transport choice out of the total replies. Based on this measurement, the percentage reflects habit strength of public transport use in our study.

#### The effect of habitual travel-mode choice on present travel-mode choice in a new town.

According to Stigler and Becker, habits are economically efficient when there is no change or only a moderate or a temporary change in the environment. They save the need to engage in information search, which is costly. Therefore, after a temporary change in the environment, it is not efficient to search for information on better behavioral options, and habits are an efficient way to deal with the new context. Consequently, we expect habits to determine travel-mode choice after temporary changes in the environment. However, they argue that after a permanent change in the environment habits are no longer an economically efficient way to deal with the new situation. Then it pays to

engage in an information search for better behavioral options. As a result, habitual travel mode choice should no longer affect travel mode choice in the new environment. A change in the environment can take place when moving to a new town. In the context of travel mode choice in Germany the assumption is made that respondents have had a good public transportation system in both their old and new environments. Indeed, in most German towns, even small ones, a good public transportation system is available, and is therefore a viable option.

#### The effect of information on travel mode choice.

Stigler and Becker argue that information is costly (P. 82). Thus, the more information obtained on a behavioral alternative relative to its price, the more will this behavioral alternative be consumed. Moving to a new town indeed requires the accumulation of new information regarding the available means of transportation. Providing such information on the product or searching for it increase the amount of information obtained. According to the model, it is expected that in such a case one would increase the number of purchases of the “cheapest”, which is also most convenient and least time consuming product. If we assume that public transportation is indeed attractive and cheap also in the new context, then people moving to the new town and receiving or searching for information on available public transportation are expected to use it in the new town more often than other movers.

However, one can think of other determinants of behavior and additional socio-economic mechanisms involved affecting travel mode choice. Socio-economic characteristics such

as education, status, or gender may reflect different preferences for public transport. One should specify bridge assumptions to link socio demographic characteristics to such preferences and restrictions which may affect behavior. However, preferences in the model are assumed to be equal among individuals, and therefore do not determine behavior and should not be explicitly incorporated into it. Restrictions are only expressed by the monetary and time costs of looking for the best behavioral options. The information costs minimization in the model is a mechanism, which depends only on these costs. The argument is that preferences are not the same and socio-economic characteristics may also affect behavior. We chose education, gender and availability of a car as additional socio-economic characteristics to be included in the conditional model, because several studies have shown their effect on travel-mode choice. We would like to test whether they have an effect controlling for the effects of habits and the possession of information postulated by the model. Availability of a car may represent a restriction and is believed to have an effect on behavior in this context since it provides an opportunity for using it (see for example Bamberg and Schmidt, 1993, 1994; Franzen, 1997). For people who do not have any car at their disposal, it is more difficult to use a car. Education might explain the tendency to choose public transportation because higher education is often related to a higher status or to a higher income group and public transport tends to have the reputation of being a means of transportation for the poor (see Preisendörfer, 2001 and Sheller and Urry, 2000, where the car is discussed as a status symbol). This might lead to a lower preference for public transport and to a negative relation between education and the use of such transportation. Namely, a negative effect of higher education on public transport use is expected. Finally, the relevant literature

proposes that females may have a lower technical affinity than men (see for example Pasero and Gottburgsen, 2002 or Wajcman and Mueller, 1994), and therefore a lower tendency to use the car as has been found by Davidov et al. (2003). The model does not propose such mechanisms. The alternative hypotheses based on these bridge assumptions and on results from previous studies will be tested in the empirical section of this paper.

## 5. Data

Data was collected in a field study in Stuttgart (Germany), which offers a cheap and convenient public transportation system that includes an underground, trams, trains and busses. The marketing department of the public transportation company in Stuttgart (Verkehrsverbund Stuttgart-VVS) was interested in motivating people moving to the town to use it. Therefore they developed an intervention program called “personal information package” which contained the following components:

- 1) An official welcome letter;
- 2) A one-day free of charge ticket to use the public transportation;
- 3) A map showing the bus routes in the town;
- 4) A timetable;
- 5) Detailed explanations on how to reach shopping and cultural centers in the town;
- 6) Information about ticket prices and about the location of ticket-sale offices;
- 7) A “hotline” telephone number.

The intervention program was conducted on an experimental group during 2001. Subjects had moved to Stuttgart shortly before the program began. Mobilizing them was done by

systematically approaching people who had published an advertisement in the weekend newspaper looking for an apartment in Stuttgart. Their published phone and email addresses were used to contact them. If they were willing to participate (the incentive was a lottery of a monetary prize), they received the first questionnaire in which they were asked to answer some questions about their travel behavior. Subjects were contacted 8-10 weeks later with the second questionnaire, namely 2-3 weeks after their move. About 4 weeks later a third questionnaire with fewer questions was sent to them asking them again about their travel mode choices.

In order to reduce selection bias as much as possible the questionnaires were constructed in such a way that they seemed to be unrelated to the intervention program. The questionnaires were delivered with the title “Decisions in moving to a new place and travel habits” without mentioning the intervention. The public transport company in Stuttgart conducted the intervention itself separately. In this way, participants were unaware of the fact that they were taking part in a field experiment. Figure 1 presents the design of the study. Mainly data collected on the second wave (after the move to the new town) are used for the empirical analysis<sup>2</sup>.

Figure 1 About Here

800 people received the first questionnaire by mail. Only 241 filled it in and sent it back. 169 (70%) respondents actually moved to Stuttgart six to seven weeks after the first questionnaire. They were randomly divided into an experimental and a control group; 90



were from the control group and 79 from the experimental group. There was no significant difference in socio-economic characteristics between the two groups. Only people from the experimental group received the information package. Two to three weeks after the intervention 169 responded and filled in the second questionnaire. This group makes up the analyzed sample.

### Variables

The dependent variable is “travel mode choice” (“TMC”) from the second wave after the intervention. Data on this variable was derived from a form filled in by the subjects about all the journeys conducted on the day they filled in the questionnaire and the means of transport used. On this form the participants reported dates and times of departure and arrival at their different destinations as well as the type of their destination (home, work, university, supermarket etc.), the distance and the means of transport used. From this form the behavioral variable was created and received the value of 1 if a subject used public transport on his second reported route on that day of filling in the questionnaire and zero if he used the car. The behavioral variable of the second reported route is applied because the questionnaire items relate to the second route on the reported day as well. See Ajzen and Fishbein, 1977, on the importance of the correspondence between the behavioral variable and the other questionnaire items.

“Habit” is a variable measuring the tendency to use public transportation. It represents the percentage of public transport choice out of the total replies to the questions developed by Verplanken, discussed in the theoretical part. Based on this measurement, the percentage

reflects habit strength of public transport use in our study. Habit was measured in the first wave and takes advantage of the panel design. “Intervention” is a dummy variable which received the value of 1 in case the subject belonged to the experimental group (and received information on available public transportation) and zero otherwise.

“Gender” receives the value of one for females and zero for men, “higher education” has the value of 1 for respondents who have obtained higher education (higher than high school) and zero otherwise. “Availability of a car” is the number of cars available in the household. “Search” is a variable representing the amount of search on available public transportation in the new town prior to the move. It is measured with a likert scale and receives the value of 5 for respondents who conducted an intensive search and 1 for no search at all.

## 6. Descriptive overview and data analysis.

In the following section a descriptive overview of the data is given, the hypotheses are specified and tested. Table 1 presents the means and standard deviations.

Table 1 About Here

As shown in Table 1, 36% of the respondents used public transport on the second wave and 47% were exposed to the intervention program. According to Verplanken’s measure of habit the average use of public transport was 28%<sup>3</sup>. 44% were women, 41% had

obtained higher education, the average number of cars available in the household was 0.98 and the average search was 3.98.

Now the hypotheses discussed in the theoretical section are tested. Some of these hypotheses are deduced from the theory but were only partly explicitly formulated by Stigler and Becker. To phrase them more precisely the following is expected:

H1) No significant effect of “habit” on “TMC” in the new context.

Since public transportation in Stuttgart is considered to be a cheap and convenient product we expect

H2) A positive and significant effect of “intervention” on “TMC”.

H3) A positive and significant effect of “Search” on “TMC”.

Finally, according to some additional hypotheses further expectations are made:

H4) “Availability of a car” to have a significant and negative effect on “TMC”;

H5) “Higher education” to have a significant and negative effect on “TMC”.

H6) “Gender” to have a significant and positive effect on “TMC”.

The hypotheses are tested in a series of logit regression models using SPSS 11.5. In each model the dependent variable is travel mode choice (TMC): traveling by car or public transportation. Missing values were imputed by the EM algorithm provided by SPSS<sup>4</sup> (on the advantages of the use of the EM algorithm to impute missing data see for example Schafer and Graham, 2002 and Enders and Peugh, 2004). We omitted four cases where the dependent variable was missing. The results are presented in table 2.

Table 2 About Here

In the first model an analysis is made to show whether habits, participation in the experimental group and search have a significant effect on travel mode choice. A positive and significant coherence between habit and public transport use can be found (1.29).

Additionally, intervention has a positive and significant impact on TMC (0.87). Not only habits but also receiving information and other components in the brochure influence the use of public transportation positively and significantly. However, search for information has no significant effect on behavior. Search has actually no effect on behavior even without controlling for the effects of habit and intervention, and therefore it was omitted from other analyses<sup>5</sup>.

In the second model we examined whether the availability of a car has an effect on travel mode choice. As table 2 demonstrates the variable does have a significant and negative influence on TMC (-0.72). In other words, having an available car decreases the chance to use public transportation. In addition, intervention still has a positive and significant effect on travel mode choice (0.90), but habit does not.

In the third model the additional effect of other socio-economic characteristics is of main interest. Table 2 indicates that higher education has a significant and negative impact on behavior (-1.07). Respondents with higher education have a lower tendency to use public transportation in the new town. The availability of a car has a significant and negative

effect as expected (-0.64). Gender has no significant effect. Intervention has a positive and significant effect (1.03) and habit has no effect in the conditional model.

The Cox & Snell  $R^2$  was only 10% and 13% in models 1 and 2 respectively, and it improved to 17% in the third model. The Nagelkerke  $R^2$  was 13% in the first model, 18% in the second model, and improved to 24% in the third model. Further implications of the results are discussed in the next section.

## 7. Discussion.

In this paper two goals were of interest.

-First, the aim was to examine an economic model put forward by George Stigler and Gary Becker to explain the effect of habit on behavior in a new context. In addition, we wanted to test whether providing information on a product or searching for it have an effect on behavior.

-Second, the completeness of the model was tested by trying to identify socio-economic mechanisms affecting behavior in the context of travel mode choice not taken into account in the economic model suggesting a wider model of rational choice than the one proposed. Indeed, Becker has called for testing the completeness of his models with data (Becker 1996, p.156).

In this model Stigler and Becker try to explain habits in an economic fashion as a utility-maximizing behavior, and draw implications regarding the effect of habits on behavior in a new context. While formulating the hypotheses to test their implications, typical

problems of empirical model testing occurred: how to measure the main component of the model, habits, and how to translate the model's implications into testable hypotheses? For habits the new measure of Verplanken et al. (1994) was applied due to criticism about the use of past behavior to measure habits. As the measure of habit is crucial to the analysis it is justifiable to apply this improved measure. Additionally, two groups were included in the field study: an experimental group, which received information, and a control group, both of which moved to a new town. We also asked respondents how much they searched for information on alternatives to use public transportation prior to their move. In this way we could test the effect of information on behavior in the new context, as implied by the model.

At first, our results demonstrated that contrary to Stigler and Becker's expectation habits had a positive and significant effect on travel mode choice in the new town. However, in the conditional models this result changed and habits did not show any significant effect, in line with theory<sup>6</sup>.

Stigler and Becker's hypothesis that information in a new context increases the tendency and frequency of the behavioral alternative to which information is given was partly confirmed. Belonging to the experimental group and receiving information on public transportation had a positive and significant effect on its use. It should be noted that this effect on behavior became non-significant in the third wave, several weeks after the intervention, suggesting that the intervention's influence on behavior was effective only for a short period of time. The variable search had no significant effect on behavior. We

would have expected that people collecting information on available public transportation would use it more often, since they could be rewarded by a cheap and convenient system of public transportation that Stuttgart offers, but this was not the case. The effect of search postulated by the theory could not be shown.

The effect of intervention may have an alternative explanation. The company provided a positive stimuli, since the brochures provided to the participants included features of the public transportation system that were probably considered positively by the recipients. Additionally, getting an official welcome or a daily free ticket are certainly positively valued acts. According to the Ajzen-Fishbein theory (see for example Ajzen and Fishbein 1977) we would expect that this leads to a positive attitude towards public transportation, and hence to an increased use of it.

The third implication from Stigler and Becker's theory saying that socio-economic characteristics should not affect behavior directly could not be fully confirmed. In introducing socio-demographic variables into the model one should construct bridge assumptions that link the proposed additional variables and the decision process of choosing public transportation. Socio-demographic characteristics reflect either different preferences for habitual public transport use, which do not seem to be equal among individuals in contrast to economic theory, or additional restrictions. In our findings higher education had a negative effect on the choice of public transport in the new context. People with different levels of education might have different preferences for the use of public transportation. Respondents with higher education have a lower preference

for public transport as demonstrated by a lower tendency to use it. A car as a status symbol might be a trigger for more educated respondents to purchase it and use it as a result of status seeking. The availability of a car also had a negative effect on behavior as has been found in most studies, but this time controlling for the effects of habits and information. Having a car eliminates restrictions and is a persistent reason to use it, even in new contexts. However, gender had no effect.

Recently there has been a growing interest in the so-called dual-process theories in social psychology (see for example Chaiken and Trope, 1999; Bamberg 2005). These theories argue that there are two systems of reasoning. One of them is automatic, unconscious and fast. The other is controlled, conscious, serial and slow. The first system is taken to be innate, to employ heuristics and to be affected by habits for example. The other system is held to be more rational, learned, flexible and responsive to rational norms. These theories could be taken as an alternative approach towards explaining effects of habits, respectively the effect of interruptions in everyday routines, such as those arising in conjunction with moves from one environment to another. Such an approach could offer an alternative explanation for the effects of the availability of a car and the interventions and for the fact that habit had no effect on behavior in the new context. The new context, the availability of a car and information could have activated a more learned, flexible and responsive system of rationality and behavior.

Ideally we would have used large-scale data to test our hypotheses. However, by using experimental data we tried to overcome some of the difficulties we would have



confronted, if we had used large-scale data sets. The experimental setting enabled us to analyze the difference between people who received or searched for information in a new context and others who did not. Such an examination is not possible with survey data. We could also apply the new habit measurement in the data, and take advantage of the panel design to test effects of habits measured in the first wave on behavior after the move. However, we are aware of the fact that our data may also lead to biased results because the sample is small, participation is not compulsory, and the sample is not representative. Future field studies might address these drawbacks.

Modeling behavior often involves the question whether rational choice should be explained and tested in a narrow version in which only objective factors such as monetary restrictions are taken into account or in a wide version, in which subjective and sociological variables are taken into account (see Opp 1999). Becker appeals for releasing some of the assumptions on individuals' preferences and including past experiences, culture, social interactions and habits in this broader approach (see for example Becker, 1996: 5-7). Becker did not release all the assumptions of traditional economic theory here since he believed that preferences are the same for all individuals. In this way, he constituted a hybrid model of the narrow and wide versions of rational choice.

Becker writes, "a close relation between theory and empirical testing helps prevent both the theoretical analysis and the empirical research from becoming sterile" (Becker, 1996: 156; see also Green and Shapiro 1994). Our empirical findings propose that Stigler and

Becker's model on habits in a new context was confirmed, but may be incomplete. The effect of some socio economic characteristics on behavior in the empirical test challenges some of its assumptions.

Table 1:

Description of Variables in the Study (Second Wave, N = 169)

Variable	Description	Mean (Std. Error in Brackets)
TMC (behavior)	1=public transport; 0=car use on the second reported route	0.36 (0.48)
Intervention Program	1=belongs to experimental group (receives information as an intervention); 0=control group, no information received	0.47 (0.50)
Habit (Verplanken's measure; measured on the first wave)	% of public transport use	0.28 (0.35)
Gender	0=males; 1=females	0.44 (0.50)
Higher education	1=higher than high school; 0=otherwise	0.41 (0.49)
Availability of a car	Number of cars in the household	0.98 (0.70)
Search	Search conducted by respondent on available public transportation 1=not at all; 5= intensive search.	3.98 (1.63)

Table 2:

Unstandardized Coefficients from Logit Regressions to Explain Travel-Mode Choice  
(Dependent Variable is “Public Transport Use”) on Selected Independent Variables  
(Standard Error in Brackets)

Variable	Model 1	Model 2	Model 3
Habit	1.29** (0.49)	0.82 (0.53)	0.75 (0.53)
Intervention	0.87* (0.35)	0.90** (0.35)	1.03** (0.37)
Search	0.02 (.11)	-	-
Number of cars available		-0.72* (0.30)	-0.64* (0.30)
Gender			0.05 (0.37)
Higher education			-1.07** (0.40)
Constant	-1.50 (0.49)	-0.62 (0.42)	-0.37 (0.45)
-2 Log Likelihood	198.625	192.238	184.004
Cox & Snell R <sup>2</sup>	0.10	0.13	0.17
Nagelkerke R <sup>2</sup>	0.13	0.18	0.24
N	165	165	165

\* P < 0.05 \*\* P<0.01 (one-tailed tests).

Figure 1: Design of the Experiment

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## Footnotes:

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<sup>1</sup> Becker also differentiates between tradition and habits. Traditional behavior refers to habits that are sensitive to choices in the more distant past because the effect of the past decays slowly. Such habits according to Becker are especially important for understanding culture and institutions.

<sup>2</sup> We chose the second rather than the third wave because the mortality rate between the second and the third wave was high. Furthermore, it is doubtful whether respondents in the third wave can still be considered to be in a new context. In such a case they may not belong to the population to which the model applies.

<sup>3</sup> Habit correlates with past behavior in the first wave positively and significantly (0.16) as expected.

<sup>4</sup> Habit had 34 and search had 44 missing values, the other variables in the analysis were complete.

<sup>5</sup> This result was not consistent with the results of the non imputed file using list-wise deletion. However, in case of list-wise deletion regression coefficients are severely distorted (see for example Schafer and Graham 2002). Therefore we believe the results using the imputed file are valid ones.

<sup>6</sup> It is assumed that before living in Stuttgart respondents had a good public transportation system, because this is very common in many German towns, so they could develop a habit of using it. The effects of habit on behavior in the third wave turned out to be insignificant as well.

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